

flat. Just east to northeast of the barn that was blown down a young apple orchard had every tree in it uprooted, broken or bent from a southwesterly direction.

Although there was no complete destruction even in the direct path of the funnel cloud, the wide extent of considerable destruction, at Whalom upwards of three-fourths of a mile, was a notable feature of this storm.

The occurrence of severe winds and partial destruction by such winds here and there was reported, while the greatest damage farther on occurred in the Merrimac Valley from a cloudburst. The downpour began at Law-

rence at 12:45 p. m. (60th mer. time), and the darkness was extreme. This rain flooded and severely washed out a number of streets, and added to the damage of the hail in an immediately preceding storm.

In connection with the strong winds, presumably in one of the storms on this date a barrel was picked up, carried half a mile and deposited on top of a tall pole at Rye Beach, N. H. Such is the statement in the Worcester Evening Post, for July 29, under a photograph of the barrel in this position.

THE GREAT HAILSTORM IN SOUTHEASTERN NEW HAMPSHIRE AND NORTHEASTERN MASSACHUSETTS, JULY 17, 1924

551.578.7 (744)(742)

By B. M. VARNEY

(Weather Bureau, Washington, August 26, 1924)

The advance of the wind-shift line eastward from the region of tornado damage described in the previous article continued to be accompanied by violent convectional overturning, which caused severe thunderstorms, with falls of hail at Lawrence, Mass., said by old residents to be more remarkable than a great fall which occurred there on July 4, 1880. Following the hailstorm after an interval of about an hour, another thunderstorm added a rainfall of almost cloudburst intensity. The total precipitation recorded at Lawrence was 1.29 inches.

Press reports indicate that the severest disturbance (which was of tornado violence only in the area noted in the foregoing account) moved about east-northeast over a belt of country some 15 miles wide and lying largely north of the Merrimack River, which in this part of its course flows also about east-northeast. The southernmost damage reported by the press occurred in Andover, south of the river, and the northernmost in Salem, N. H. That the heaviest disturbance passed off the New England coast between Newburyport, Mass., and Portsmouth, N. H., is shown by the accounts of torrential rains and high winds at the former place, and of the depositing of the barrel on a telegraph pole at Rye Beach, N. H., as noted by Dr. Brooks. There are no reports of extraordinary conditions at Portsmouth. The movement thus indicated corresponds somewhat closely in direction with that of the center of the controlling cyclone, as nearly as that can be determined from the weather maps. At Blue Hill Observatory (640 ft. altitude) a maximum wind velocity of 72 miles per hour was recorded during the passage of the squall line.

On the maps herewith are shown the pressure distributions concerned, for 8 a. m. and 8 p. m., 75th meridian time, July 17, 1924. Arrows show the observed wind at selected stations (the initial letters of which are shown), the broken lines show the approximate positions of the wind-shift line, and the symbol of parallel lines on the 8 p. m. map the position of the belt (as well as it can be located from published reports) within which occurred the hail storm and the rainstorm here referred to and the tornado and high winds discussed in the foregoing paper.

The disturbance as reported from Lawrence and vicinity consisted of two distinct parts, as will be noted in the following quotation from the Lawrence Telegram of July 17, 1924: "Two of the most spectacular and unusual freak summer storms in the history of Lawrence visited the city within the short space of two hours Thursday and did damage that will run into the thousands of dollars.

"Nature sent a thunder and lightning storm about 11 o'clock calculated to strike terror into the stoutest of

hearts, when darkening skies, roaring thunder, flashing lightning, and sweeping rains were followed by a shower of hailstones varying from countless lumps of ice the size of marbles to thousands of larger ones as big as hen's eggs.

"The hailstorm in itself was thrill enough for one day, but the elements were not finished. At 12.45 a darkness as of night descended over the city, the thunder rumbled, the lightning flashed, and in a twinkling Lawrence was deluged in a fall of rain that was a veritable cloudburst. The rain swept down upon the darkened city in torrential sheets flooding the streets, overrunning the sidewalks and completely exceeding the capacity of the city sewers.

"The hailstorm was the most severe and unusual within the memory of the oldest resident of the city and the city underwent a veritable bombardment of icy pellets. Up to press time nobody had been reported injured, but that was nothing more or less than a miracle, because most of the icy stones falling were of a size sufficient to stun and injure anyone struck by them. To talk of hailstones as large as hen's eggs may seem like exaggeration to those who were not in the city during the storm, but thousands of local residents present can truthfully testify that they were the rule rather than the exception, while the sizes in odd cases ran to almost unbelievable extremes. [In Methuen and Salem counties lumps of ice larger than baseballs are reported to have fallen.—Ed.]. The Lawrence Common and lawns all over the city were covered after the storm with thousands of hailstones of all sizes.

"The places in this vicinity which suffered the worst were Salem, N. H., and Methuen, in the opinion of those who visited the different localities after the storm. North Andover and Boxford were hit hard also, but very little damage was caused in Lawrence or Andover except in isolated cases. The storm, which came from the north, cut a wide swath through Salem and Methuen. According to observers the storm struck Salem with all its force and then moved southward, striking the western section of Methuen, where it veered eastward and moved in the direction of Pleasant Valley across the northern and central section of the town. Near Pleasant Valley it swerved to the south across the Merrimack river, struck North Andover and Boxford and continued on toward Haverhill following the course of the river. Only the edge of the storm vortex [?] was felt in Lawrence and consequently the damage was not as heavy as in Methuen and Salem which felt the full force of the gale and the accompanying hailstones.

"An exact estimate of the damage caused by the storm is impossible because of the wide area affected and because in some localities the damage was so widespread that it

would be impossible to reach a fair estimate of it. In Salem, N. H., the crops and fruit trees on almost every farm were destroyed and one Salem farmer stated that the farms in his vicinity were practically ruined. Innumerable fruit trees were shorn of their budding fruit, corn and other crops were levelled to the ground, market gardens were riddled by the hail and hundreds of windows in farmhouses and barns were broken.

phone lines were reported out of commission, an estimated total damage of \$15,000 occurred to four green-houses (none of them insured and one of them, under construction, just nearing completion), while in a school building nearly all the window panes on the north side on two floors were broken.

The total damage from the hailstorm in Lawrence, Methuen, and Salem is placed at \$75,000. Of this, some

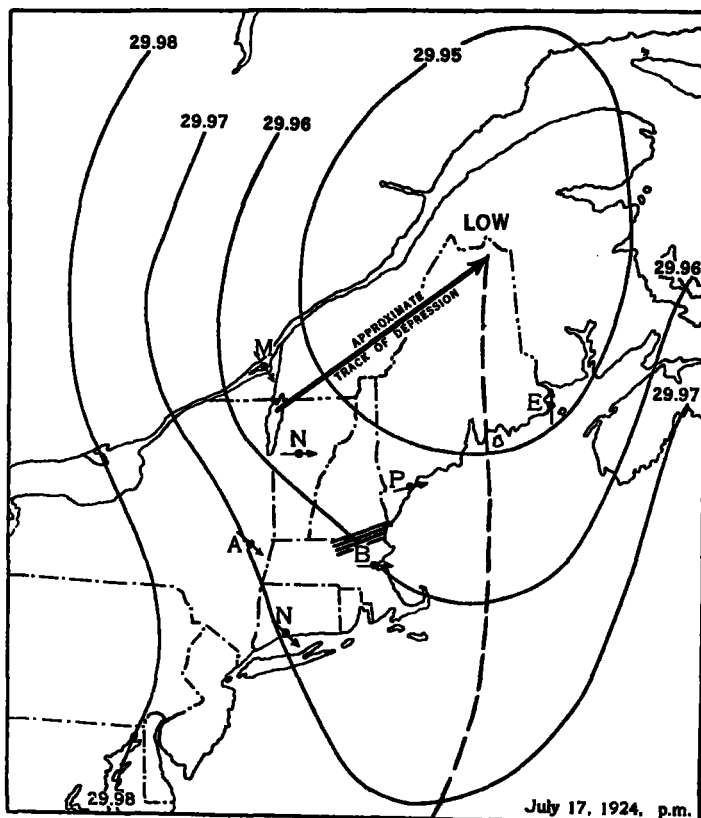
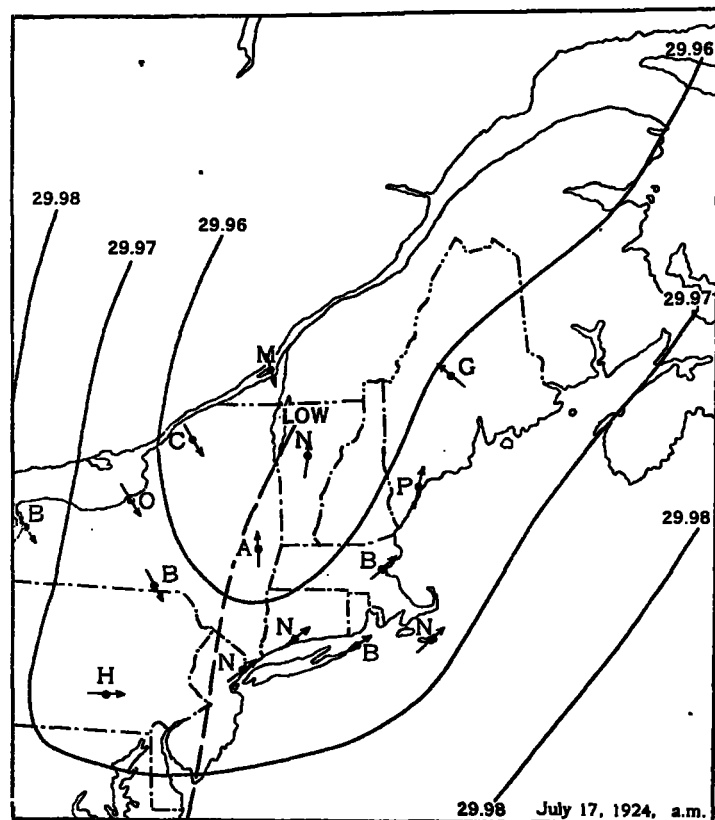


FIG. 1.—Pressures, wind directions and approximate positions of the wind shift line over New England at 8 a. m. and 8 p. m., July 17, 1924. The parallel lines on the 8 p. m. map in southeastern New Hampshire and northeastern Massachusetts show approximately the area within which occurred the damage noted in this and the preceding article

"In Boxford and North Andover the storm caused more damage than in Lawrence. The crops on many farms were riddled and leveled to the ground by the large hailstones, and fruit trees were ruined. The damage to crops and trees is estimated at several thousand dollars."

Though Lawrence appears to have suffered less from the hailstorm than the surrounding country, 500 tele-

\$50,000 is assigned to destroyed crops, including extensive injury to fruit on trees. Expense of remaking street grades, of which many on the hillier parts of Lawrence were badly washed out during the second storm, and of restoring storm sewers to working order, will add some thousands of dollars to the above sum.

WINDSTORMS IN WISCONSIN, AUGUST 7, 1924

By W. P. STEWART

[Weather Bureau, Milwaukee, Wis., Sept. 10, 1924]

Two tornadoes which formed almost simultaneously in west-central Wisconsin during the evening of August 7, 1924, caused seven fatalities and a property loss estimated at about \$300,000.

The first of these storms appeared in the vicinity of Osseo, Trempealeau County, about 6:30 p. m., moving from northwest to southeast. It was last reported near Black River Falls, Jackson County, about 27 miles southeast, half an hour later. The funnel-shaped cloud was seen by all observers. The width of the path of great destruction was variously estimated as from 1,000 feet to a mile. Four persons were killed, and many were more or less seriously injured. A few dwelling houses and a large number of farm buildings were destroyed.

The second tornado originated apparently a few miles northwest of New Auburn, Chippewa County, probably just north of the Barron County line. It moved from northwest to southeast and was first reported at 7:00 p. m. The funnel-shaped cloud was seen by many observers. The width of the path of great destruction was about 60 rods, and the length 8 to 10 miles. Three persons lost their lives and approximately 100 were injured. Several farm residences and a large number of other farm buildings were destroyed. The loss of crops from both of these tornadoes was heavy. It is not practicable to estimate the speed with which these storms moved, as the time is not reported with sufficient accuracy.